Wallaby 3
Phototherapy System

Service
Manual

RESPIRONICS®

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RESPIRONICS®

Limited Warranty

Respironics, Inc. warranties your Wallaby™ 3 Phototherapy System against defects in material and workmanship of the illuminator unit only for a period of one (1) year from the date of purchase, one hundred eighty (180) days on the fiber optic panels, EG-2000 and EG-2000N. This warranty does not cover the lamp, or any damage to the illuminating unit or the lamp ballast caused by accident, misuse, tampering, or negligence such as failure to follow the instructions provided in this guide. In the event your phototherapy illumination unit fails to give satisfactory performance within the warranty period and conditions, Respironics, Inc. will repair or replace your illuminating unit at no charge for parts or labor.

This Product will perform in conformity with the description thereof contained in this manual and accompanying labels and / or inserts, when assembled, operated, maintained and repaired in accordance with the instructions provided. This Product must be checked periodically. A defective Product should not be used. Parts that are broken, missing, plainly worn, distorted, or contaminated should be replaced immediately. Failure to use Respironics, Inc. replacement parts, including lamps, renders any written or implied warranty on the unit null and void. Should repair or replacement become necessary, Respironics, Inc. recommends that a telephone or written request for service advice be made to Respironics, Inc. In the U.S. and Canada, the telephone number to contact Customer Satisfaction is 1-800-345-6443. The international telephone number to contact Customer Satisfaction 1-724-387-4000.

This Product, or any of its parts, should not be repaired other than in accordance with written instructions provided by Respironics, Inc. and by Respironics, Inc. trained personnel. The Product must not be altered without the prior written approval of Respironics, Inc. Quality Assurance Department. The user of this Product shall have the sole responsibility for any malfunction that results from improper use, faulty maintenance, improper repair, damage, or alteration by anyone other than Respironics, Inc.

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Overview: Wallaby 3 Phototherapy System Technical Service Manual

Warranty		Details the Respironics warranty policy for the Wallaby 3 Phototherapy System.
Table of Contents		Lists the chapters included in this manual.
Chapter 1:	**Introduction**	Introduces the Wallaby 3 Phototherapy System and gives Technical Support contact information.
Chapter 2:	**Warnings, Cautions, and Notes**	Lists the Warnings, Cautions, and Notes.
Chapter 3:	**Specifications, Features, Description, and Theory of Operation**	Provides specifications, a functional description and theory of operation, and alarm system summary for the Wallaby 3 Phototherapy System.
Chapter 4:	**System Setup Procedures**	Details system setup procedures and gives instructions for the battery, cycle time, and oxygen verification tests.
Chapter 5:	**Maintenance**	Details the periodic maintenance that should be performed on the unit.
Chapter 6:	**Troubleshooting and Diagnostics**	Provides a troubleshooting table and diagnostic information.
Chapter 7:	**Repair and Replacement**	Describes detailed procedures of removing and installing all major components within the unit. Includes graphics and photographs for visual identification.
Chapter 8:	**Testing**	Provides the calibration process, post replacement testing procedures, and Testing Data Sheets.
Appendix A:	**Tools and Equipment**	Details the necessary tools, supplies, and test equipment required for servicing and testing.

Overview (Continued)

Appendix B: Schematics	Provides the system schematics.

NOTE: The system schematics are proprietary and are to be used for reference only.

Index:	Provides an alphabetical listing of key components and terms.

Chapter 1: Introduction

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Chapter 1: Introduction

1.1 Wallaby 3 Phototherapy System Overview

The Model 3600 Wallaby 3 Phototherapy System (Wallaby 3), shown in Figure 1-1, is a phototherapy illuminator medical device that provides therapeutic light through a fiber optic cable bundle and panel for the treatment of neonatal jaundice (hyperbilirubinemia). The Wallaby 3 is primarily used in the home care environment.

The Wallaby 3 uses a set wavelength, irradiance, and surface area exposure to photochemically convert water-insoluble bilirubin into water-soluble photo products that are mostly excreted into bile. The therapeutic light is delivered from a tungsten-halogen bulb through a fiber optic cable and is emitted from the sides and ends of the fibers inside a plastic pad.

The unit incorporates two toggle switches, two Light-Emitting Diode (LED) signal lights, and an hour meter. The unit may be operated using AC 120 / 230 VAC 50 / 60 Hz power. Note that the Wallaby 3 is a replacement product for the Wallaby 2 and can use existing Wallaby phototherapy panels.

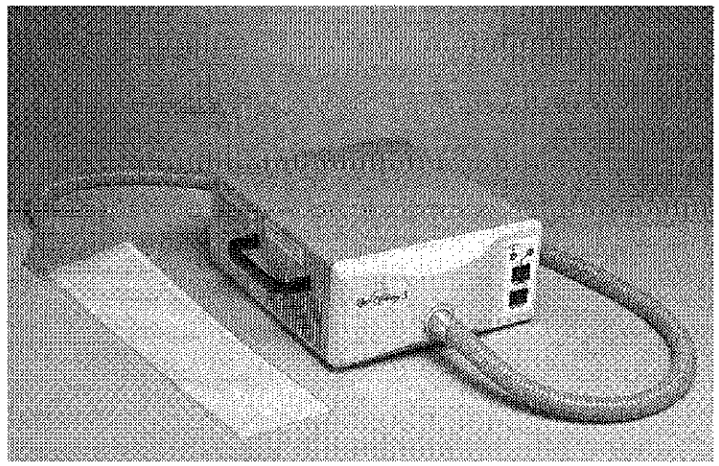

Figure 1-1
The Wallaby 3 Phototherapy System

1.2 Service Notice

This service manual was prepared by Respironics primarily for use by technicians to service the Wallaby 3. The individuals using this manual to service the Wallaby 3 should have prior training or experience servicing phototherapy illuminator devices.

1.3 Technical Support Statement

Respironics is committed to customer satisfaction and may be contacted with any questions or for technical support. For technical assistance or replacement part ordering information, contact Respironics Customer Service.

For additional information or technical support, contact:

U.S. and Canada

Phone: 1-800-345-6443
Fax: 1-800-422-5816

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Chapter 2: Warnings, Cautions, & Notes

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Chapter 2: Warnings, Cautions, & Notes

The following warnings, cautions, and notes apply to the Wallaby 3 Phototherapy System (Wallaby 3).

WARNING: Indicates the possibility of injury to the patient, operator, or technician.

CAUTION: Indicates the possibility of damage to the unit.

NOTE: Places emphasis on an operating characteristic.

2.1 WARNINGS

2.1.1 Safety

- This unit is intended for neonatal use only.
- This unit is not intended for life support or life sustaining applications.
- The instructions in this manual are not intended to supersede established medical protocols.
- Allow the unit to cool for ten minutes before attempting to remove the lamps.
- Never put fingers or objects into the opening on the front of the unit.
- If the unit falls into water, do not reach for it without first unplugging the power cord. Contact Respironics Customer Service.
- Do not place the unit on its side.

2.1.2 Operational

- Do not use the unit outdoors, where aerosol spray products are used, or where oxygen is administered.
- Do not use the unit while bathing the patient.
- Never operate the unit if it has a damaged power cord or plug.

2.1.3 Service

- To assure the safety of the service technician and the specified performance of the unit, Respironics recommends that only technicians having prior training or experience servicing illuminator units perform any repairs or adjustments to the unit.
- High voltages are present inside this unit. To avoid electrical shock, disconnect the electrical supply before attempting any repairs on the unit.

Warnings (Continued)

2.1.4 Cleaning

- To avoid electrical shock, disconnect the electrical supply before cleaning the Wallaby 3. DO NOT immerse this unit into any fluids.

2.2 CAUTIONS

- Electronic components used in this unit are subject to damage from static electricity. Repairs made to this unit must be performed only in an antistatic, Electro-Static Discharge (ESD) protected environment.
- Federal law (USA) restricts this unit to sale by, or on the order of, a licensed physician. The Wallaby 3 should be used only under the supervision of a physician.
- Use the Wallaby 3 only for its intended use as described in this manual.
- Always place the illuminator unit on a hard, flat surface.
- Never block the air vents of the unit or place it on a soft surface such as a bed, crib, carpeted floor, or couch where the air vents may be blocked.
- Always connect the unit to a properly grounded outlet.
- Do not operate the unit on its side (with the handle facing upwards).
- Do not leave the unit **ON** when the fiber optic panel is not around the baby.

Cautions (Continued)

- Do not dry the fiber optic panel with artificial heat.
- Keep the unit away from any heated surface.
- Do not scratch, damage, or soil the light input end of the fiber optic panel.
- Do not place sharp or heavy objects on the fiber optic panel. This can damage the panel and affect its light output.
- The information in this manual is provided for service personnel reference and is not intended for system setup or use. System setup should be performed by appropriate personnel using Home Care Dealer Instructions.

2.3 NOTES

Refer to the Wallaby 3 Phototherapy System Professional Manual for product use and additional Warnings, Cautions, and Notes.

Additional Warnings, Cautions, and Notes are located throughout this manual.

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Chapter 3: Specifications, Features, Description, & Theory of Operation

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Chapter 3: Specifications, Features, Description, & Theory of Operation

3.1 Overview

This chapter describes the Wallaby 3 Phototherapy System (Wallaby 3) specifications and features, and provides a functional description and theory of operation of the unit.

3.2 Specifications

ENVIRONMENTAL:

Operating Temperature	59 – 95 °F (15 – 35 °C)
Storage Temperature	-68 – 140 °F (-20 – 60 °C)
Relative Humidity	Up to 95%

NOTE: Allow the unit to stabilize within its operating temperature and humidity range prior to operation.

PHYSICAL:

Wallaby 3

Weight	7.2 lbs (3.3 kg)
Dimensions	10.25" (W) × 9.0" (D) × 4.0" (H) (26.04 × 22.86 × 10.16 cm)

Large Panel Model EG2000

Dimensions	14.0 " (W) × 4.0" (D) (35.56 × 10.16 cm)

Neonatal Panel Model EG2000N

Dimensions	5.0 " (W) × 4.0" (D) (12.70 × 10.16 cm)

ELECTRICAL:

Nominal Power Consumption	200 Watts
AC Input Voltage	100 / 230 VAC; 50 / 60 Hz
Class	Protection against electrical shock: Class I
Chassis Leakage Current	Less than 100 µA normal condition, 300 µA single fault
Ground Impedance	Less than 0.1 Ohm

FUSES:

Fuses	There are no replaceable fuses.

MECHANICAL REQUIREMENTS:

Light Intensity (Minimal)

*Large Panel Model EG2000	Level 1: 10 microW/cm²/nm Level 2: 15 microW/cm²/nm
*Neonatal Panel Model EG2000N	Level 1: 25 microW/cm²/nm Level 2: 35 microW/cm²/nm
Lamp	600 minimum hours at low intensity 285 minimum hours at high intensity RI P/N 3600-026*

* Respironics replacement lamps must be used in the Wallaby 3 unit.

Specifications (Continued)

Main Chassis	Aluminum
Front Panel	Plastic material is UL rated 94V-O.
Surface Temperature	Not to exceed 122 °F (50 °C) in an ambient of 77 °F (25 °C) during any mode of operation.

ALERTS AND SAFETY CHARACTERISTICS:

Start-Up Test	All Light Emitting Diodes (LEDs) illuminate at power on to indicate the LEDs are functioning properly. Start-up test lasts about 1.5 seconds.
Alert Condition (Service Required)	The alert LED illuminates if the device detects a malfunction. The following conditions cause an alert:
Active Amber Alert	When powered on, neither lamp will illuminate. When the unit detects maximum temperature specifications.
Blinking Amber Alert	When the controller printed circuit board (PCB) detects a single lamp failure.
Thermal Protection	A thermal switch shuts off the lamp at 140 °F (60 °C) to avoid overheating.

EMC COMPLIANCE:

EN60601-1-2	Medical electrical equipment, Part 1: general requirements for safety, and Part 2: Electromagnetic compatibility – Requirements and tests.

SAFETY COMPLIANCE:

UL 2601-1	Medical electrical equipment
CSA C22.2 601-1M90	No. 601-1 medical electrical equipment
EN60601-1	Medical electrical equipment

3.3 Features

AC Power Inlet	Connect the AC power cord here.
AC Power Cord	This is a detachable, 6 foot long, hospital grade, three prong plug.
AC Power Switch	Rocker style switch used to toggle the power either on or off.
Fiber Bundle Cable w/ Fiber Optic Light Panel	This is connected to the unit's fiber bundle connector.
Fiber Bundle Connector	Connect the metal end of the fiber bundle cable here.
Handle	This is used to carry the unit.
Hour Meter	Elapsed time indicator displaying hours of use, with 0.1 hour resolution, externally visible for dealer maintenance.
LED (Green) - Power On LED	This green LED signals when the unit is powered on and ready for use.
LED (Amber) - System Alert LED	This amber LED signals when an alert condition is detected.
Light Level Switch	Rocker style switch used to toggle the light level between 1 and 2.

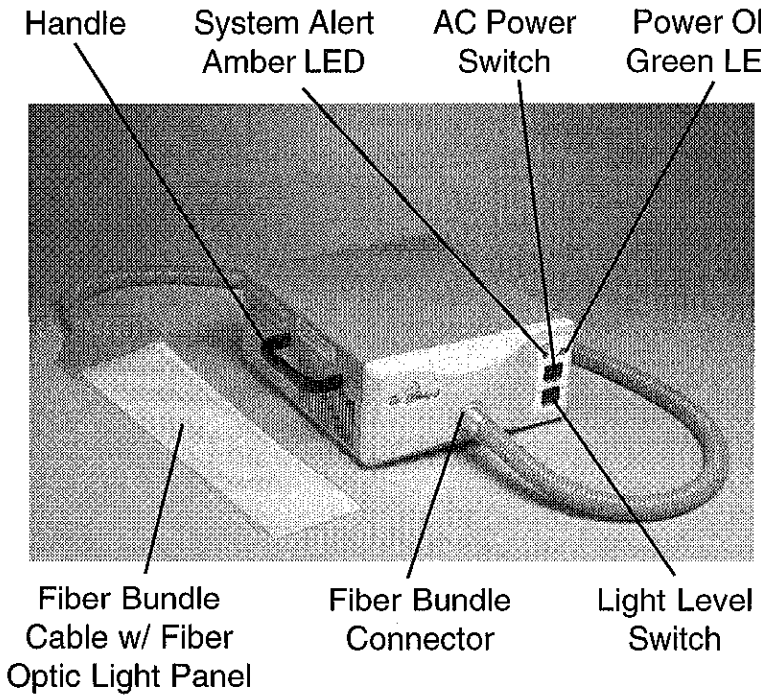


Figure 3-1 Features

Features (Continued)

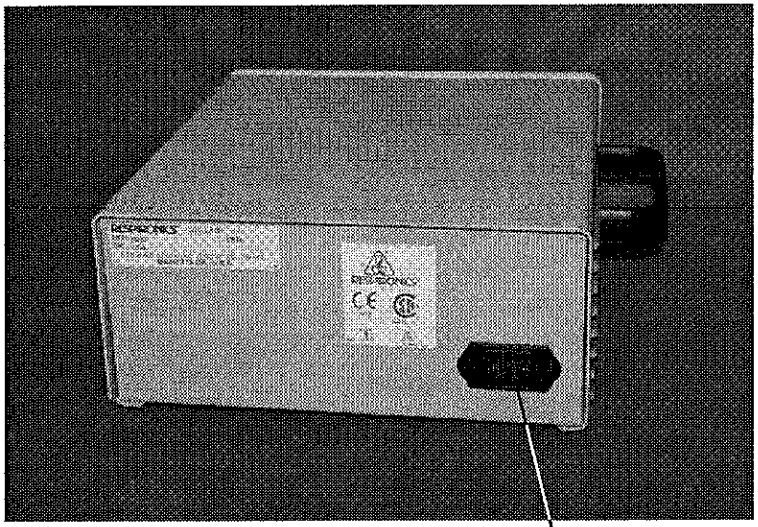
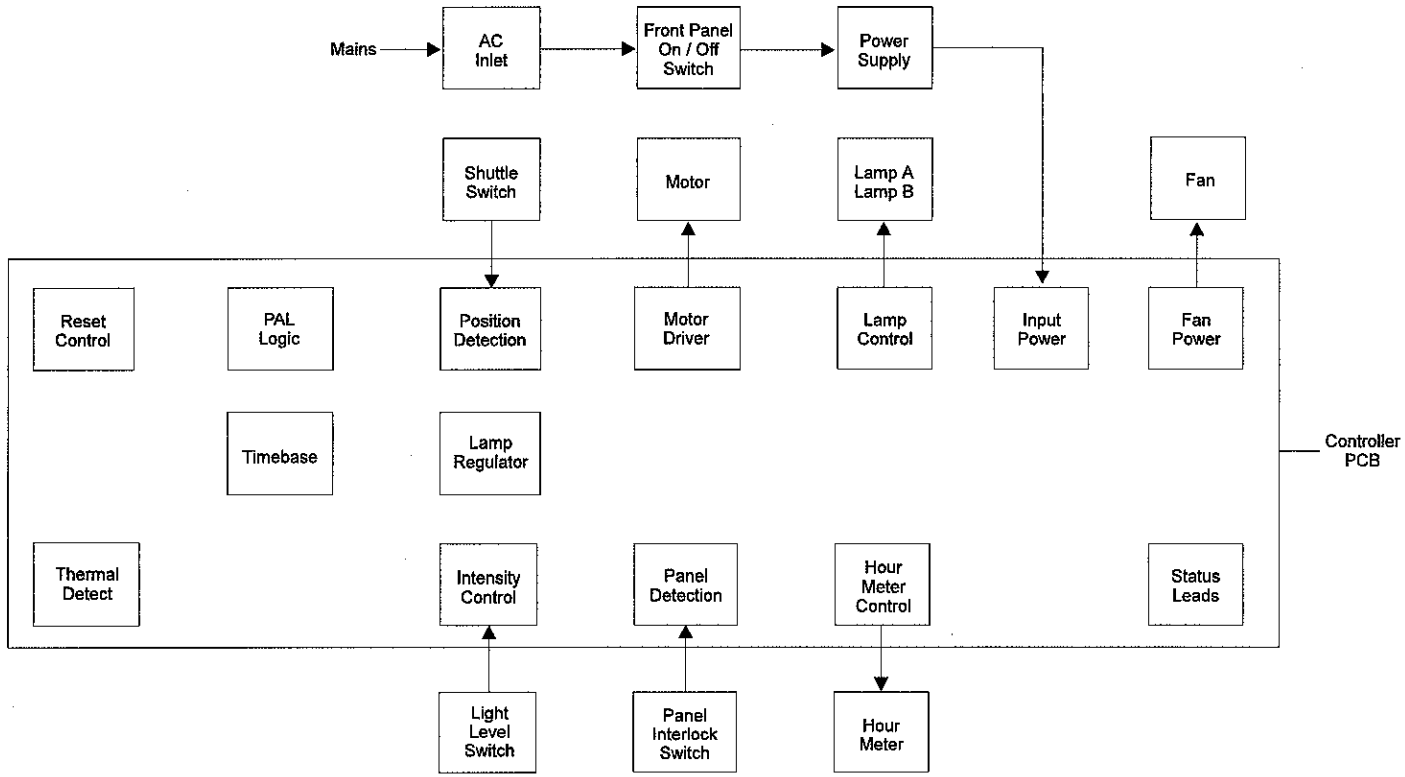


Figure 3-2
Features (Continued)

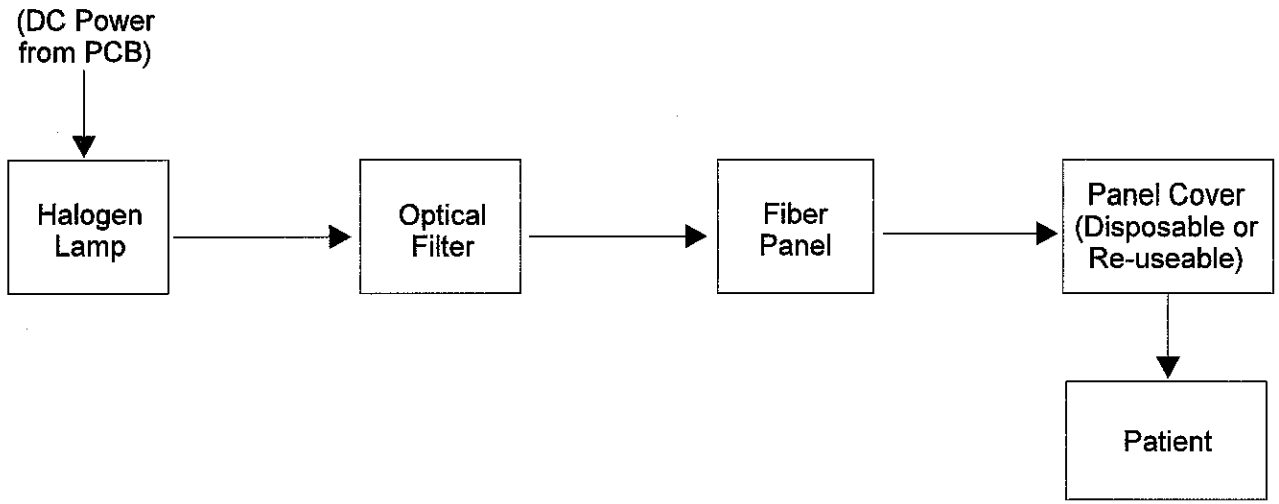
3.4 Functional Description

When the Wallaby 3 is plugged in, voltage alternating current (VAC) from the AC inlet is sent to the AC power switch. When the power switch is on, the VAC is then sent to the power supply. The power supply converts the VAC to 25.125 voltage direct current (VDC) and sends out 25.125 VDC to the controller printed circuit board (PCB). The controller PCB then provides the proper voltage to the lamp for the selected intensity.

3.5 Electronics Block Diagram



3.6 Light Path Block Diagram



3.7 Theory of Operation

3.7.1 Front Panel

The front panel consists of the Wallaby 3 label, two rocker switches, two LED signal lights, and a light transmission medium. The top rocker switch, labeled power, toggles the unit on and off, as labeled. The bottom rocker switch, labeled light level 2 to 1, toggles the light intensity from High to Low.

3.7.2 Controller Printed Circuit Board (PCB)

The controller PCB is the control center of the unit. The controller PCB utilizes a programmable logic chip to read from and write to various I/O devices (LEDs, motor control circuitry, light level switches, etc.). With this information, the unit is able to deliver the desired level of light needed for phototherapy in a safe and reliable manner.

3.7.3 Power Supply

The Wallaby 3 power supply is a universal input switching supply accepting an input line voltage from 100 VAC to 230 VAC at a nominal frequency of 50 Hz or 60 Hz. AC power is converted to DC power at a nominal output voltage of 25.125 VDC, with a total output power of 160 watts.

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Chapter 4: System Setup Procedures

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4.3 Required and Alternate Accessories 4-6

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Chapter 4: System Setup Procedures

4.1 Overview

This section provides an overview of the Wallaby 3 Phototherapy System (Wallaby 3) setup. Prior to each patient setup, the light intensity of the unit should be checked using the Joey Dosimeter. Refer to Chapter 8, Testing, for Joey Dosimeter operating instructions. Refer to Chapter 5, Routine Maintenance, or Chapter 7, Repair & Replacement, for lamp replacement instructions.

CAUTION: If the Wallaby 3 has been exposed to very hot or very cold temperatures, allow it to adjust to room temperature (approximately two hours) before beginning setup.

4.2 System Setup

Step 1 Place the Wallaby 3 on a hard, flat surface, away from any heat source. It should be no more than four feet from the patient.

Step 2 Insert the metal end of the fiber bundle cable, with the metal post facing up, into the panel inlet port located on the front panel. Push the end of the cable into place so that it cannot be easily pulled loose.

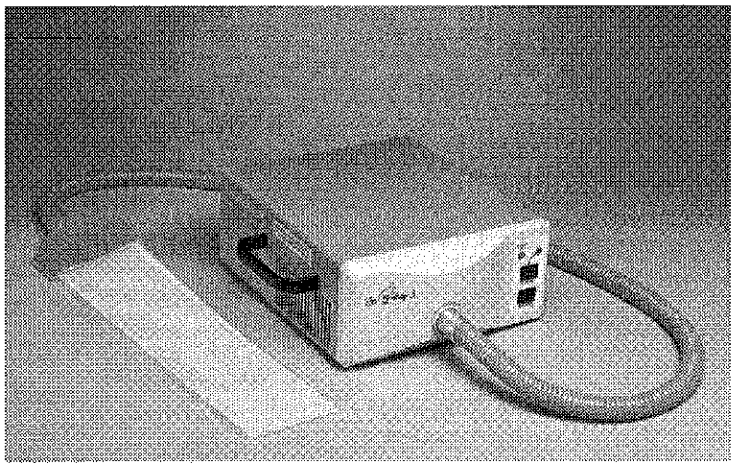

Figure 4-1
Fiber Bundle Cable Connected to the Unit

NOTE: Do not block any of the air vents on the side of the illuminator. Do not place illuminator on its side.

NOTE: The cable will not lock into a set position and can be rotated in the fiber bundle connector.

Step 3 Plug the female end of the AC power cord into the AC power inlet in the back of the Wallaby 3.

Step 4 Plug the male end of the AC power cord into an electrical outlet.

Step 5 Place the fiber optic light panel on the patient.

Step 6 Verify that the light level switch, located on the front panel, is set to the intensity level recommended by the physician.

Step 7 Move the AC power switch, located on the front panel, to the ON position to power up the unit. (The green power light emitting diode (LED) will illuminate.)

4.2.1 Green LED - Power On

The green power indicator LED will illuminate when the AC power switch is moved to the ON position. Refer to Chapter 6, Troubleshooting and Diagnostics, if the LED does not illuminate.

System Setup (Continued)

4.2.2 Amber LED - System Alert

If one lamp is burned out, the amber system alert LED will blink. If both lamps have burned out, or if the illuminator unit has overheated, the amber system alert LED will remain active. Refer to Chapter 6, Troubleshooting and Diagnostics and then Chapter 5, Routine Maintenance, or Chapter 7, Repair & Replacement for lamp replacement instructions.

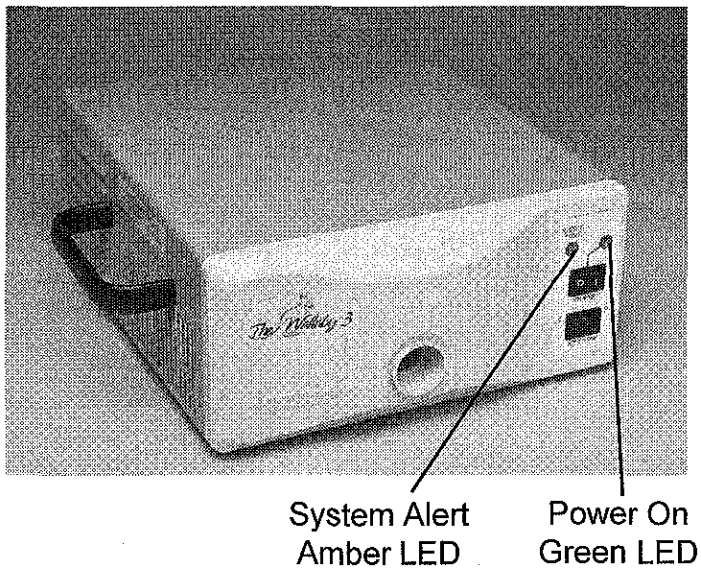

Figure 4-2
Location of the LEDs

4.3 Required and Alternate Accessories

This section addresses the required and alternate accessories that are used with the Wallaby 3 Phototherapy System. For additional information, refer to the Wallaby 3 Phototherapy System Professional Manual, the Wallaby 3 Phototherapy System Parents Guide, or the literature supplied with the accessories.

4.3.1 Required Accessories

To use the Wallaby 3 Phototherapy System, the following accessories are required to assemble the circuit.

Recommended Patient Circuit:

- Respironics Standard Wrap Around Panel w/ Light Transmission Cable (RI P/N EG-2000) , or
- Respironics Neonatal Flat Panel w/ Light Transmission Cable (RI P/N EG-2000N)

4.3.2 Alternate Accessories

- Joey Dosimeter Model JD-100
- Disposable Panel Cover (RI P/N 50187, 50189) - The disposable cover provides a sterile, transparent interface between the patient and the phototherapy panel. Note that disposable covers are not supplied with the unit and are packaged independently.
- Carrying case (RI P/N CC302) - An optional carrying case, designed to hold the device and one phototherapy panel, is available.

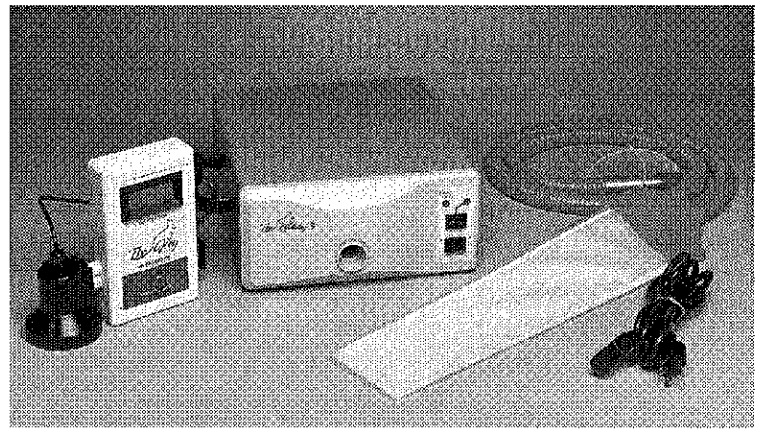

Figure 4-3
Wallaby 3 with Accessories

Chapter 5: Maintenance

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5.4 Replacing the Lamp(s) 5-6

5.5 Preserving Lamp Life 5-9

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Chapter 5: Maintenance

5.1 Overview

This chapter provides guidelines and illustrates the cleaning and maintenance procedures for the Wallaby 3 Phototherapy System (Wallaby 3).

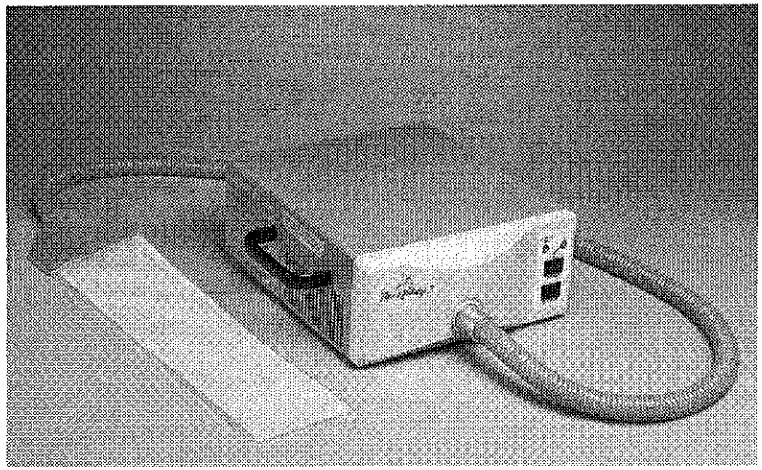

Figure 5-1
The Wallaby 3 Phototherapy System

Before cleaning or performing any routine maintenance, always switch the Wallaby 3's AC power switch to the OFF position and unplug the power cord from the power source and the rear of the unit.

5.2 Cleaning the Illuminator Unit and Fiber Optic Panel

WARNING: To avoid electrical shock, disconnect the electrical supply before attempting to clean the Wallaby 3. Do not immerse the unit or any accessory equipment in water or allow any liquid to enter the unit or fiber bundle connector port.

Step 1 Prepare a cleaning solution, using water and a mild dish detergent, a 10% bleach solution, or full strength ammonia. Mix the liquid according to the product manufacturer's label directions.

Step 2 Wipe the outside of the unit and the fiber optic panel with a sponge or cloth slightly dampened with the cleaning solution.

Step 3 Let the unit and fiber optic panel air dry before reconnecting the electrical supply.

CAUTION: Do not dry the illuminator unit or fiber optic panel with any means of artificial heat.

CAUTION: Do not use the following solutions on the illuminator unit or fiber optic panel, as they could leave harmful residue on the surface.

- Phenolic compound based germicide cleaner / disinfectant
- Gluteraldhyde disinfectant / sterilants
- Regular commercial cleaners or laundry detergents
- Iodine solutions, strong acids, or strong alkali solutions

CAUTION: Keep the fiber optic panel away from sharp objects that could scratch or puncture the cover.

5.3 Cleaning the Optical Filter

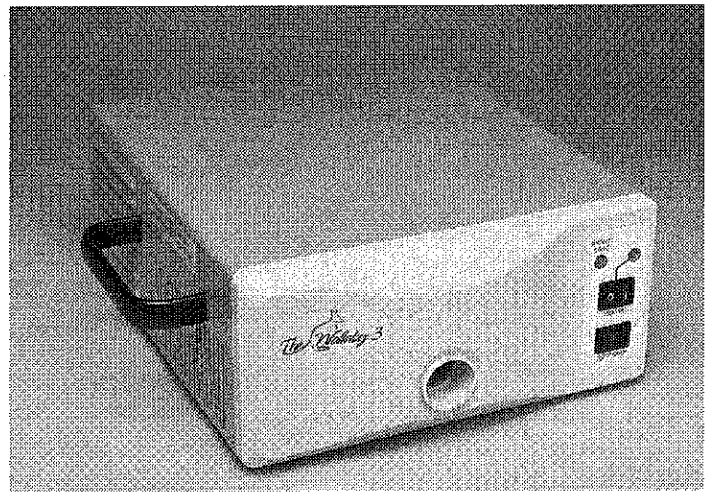

Figure 5-2
Location of the Optical Filter

Step 1 The optical filter is located inside the unit (see Section 7.4.18, Optical Filter Assembly Replacement, for detailed instructions on accessing the optical filter). You should clean the filter whenever the irradiance levels are below the acceptable range.

WARNING: To avoid electrical shock, disconnect the electrical supply before attempting to clean the Wallaby 3. Do not immerse the unit or any accessory equipment in water or allow any liquid to enter the unit or fiber bundle connector port.

Step 2 Accessing the front of the optical filter through the fiber bundle connector, use a fresh cotton swab, wet with alcohol, to wipe across the filter in one direction.

Step 3 After one pass across the face of the filter, discard the cotton swab.

CAUTION: Do not rub the cotton swab from side to side across the filter.

Step 4 Accessing the back of the optical filter through the light access door, again use a fresh cotton swab, wet with alcohol, to wipe across the filter in one direction.

NOTE: If after cleaning the filter the irradiance levels are still below the acceptable range, replace the lamps. As the lamp comes close to failure, the irradiance levels will drop.

CAUTION: Do not touch the optical filter with your hands. Oil from skin can degrade the optical filter.

5.4 Replacing the Lamp(s)

The Wallaby 3 is equipped with an amber system alert LED that blinks whenever a lamp fails to operate. There are two lamps inside the unit. Whenever one lamp fails, the second lamp is automatically moved into place.

WARNING: To avoid electrical shock, disconnect the electrical supply before attempting to clean the Wallaby 3. *Do not immerse the unit or any accessory equipment* in water or allow any liquid to enter the unit or fiber bundle connector port.

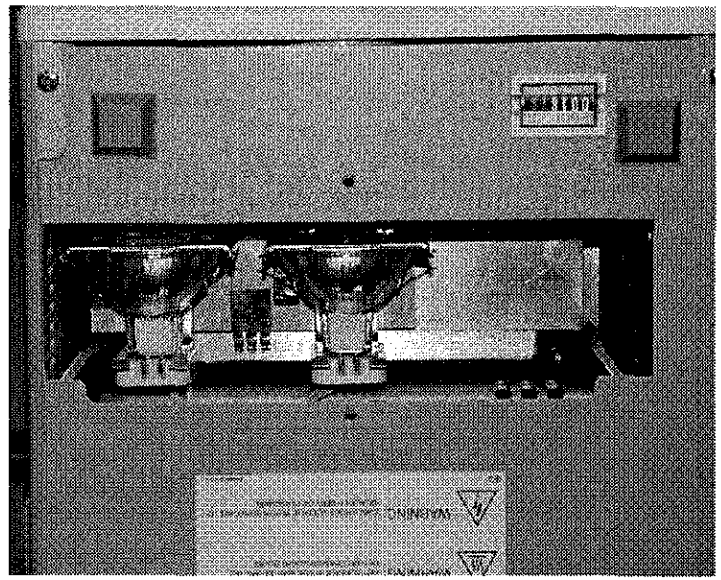

Figure 5-3
Location of the Lamps

Replacing the Lamp(s) (Continued)

Replace the lamps ONLY with the lamps recommended for the unit. Use of lamps other than those specified in this manual will affect the performance of the Wallaby 3 and may cause damage to the unit or fiber optic panel, or cause reduced clinical effectiveness.

NOTE: Failure to use Respironics lamps (RI P/N 3600-026) will render the warranty on the Wallaby 3 Phototherapy System null and void.

NOTE: An authorized service representative is responsible for all maintenance, except lamp replacement.

Step 1 Power off the unit and disconnect the power cord from the power source. Wait at least five minutes for the lamp to cool, if applicable.

Step 2 On a protected work surface, carefully turn the unit over exposing the bottom of the main chassis.

Step 3 Using a Phillips screwdriver, remove the two screws that secure the light access door to the bottom of the main chassis.

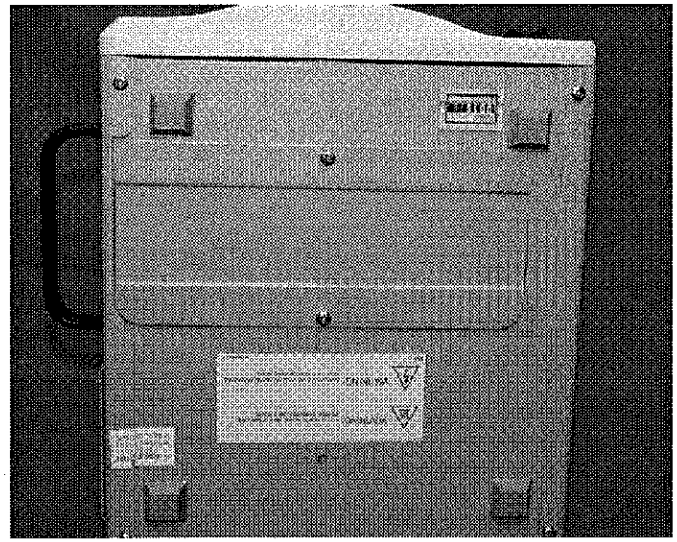

Figure 5-4
Light Access Door Screw Location

Step 4 Remove the light access door.

NOTE The burned out lamp will be either on the far left or the far right side of the unit. The center lamp will be the properly functioning lamp.